Flight

A Journal devoted to the Interests, Practice, and Progress of —Aerial Locomotion and Transport.—

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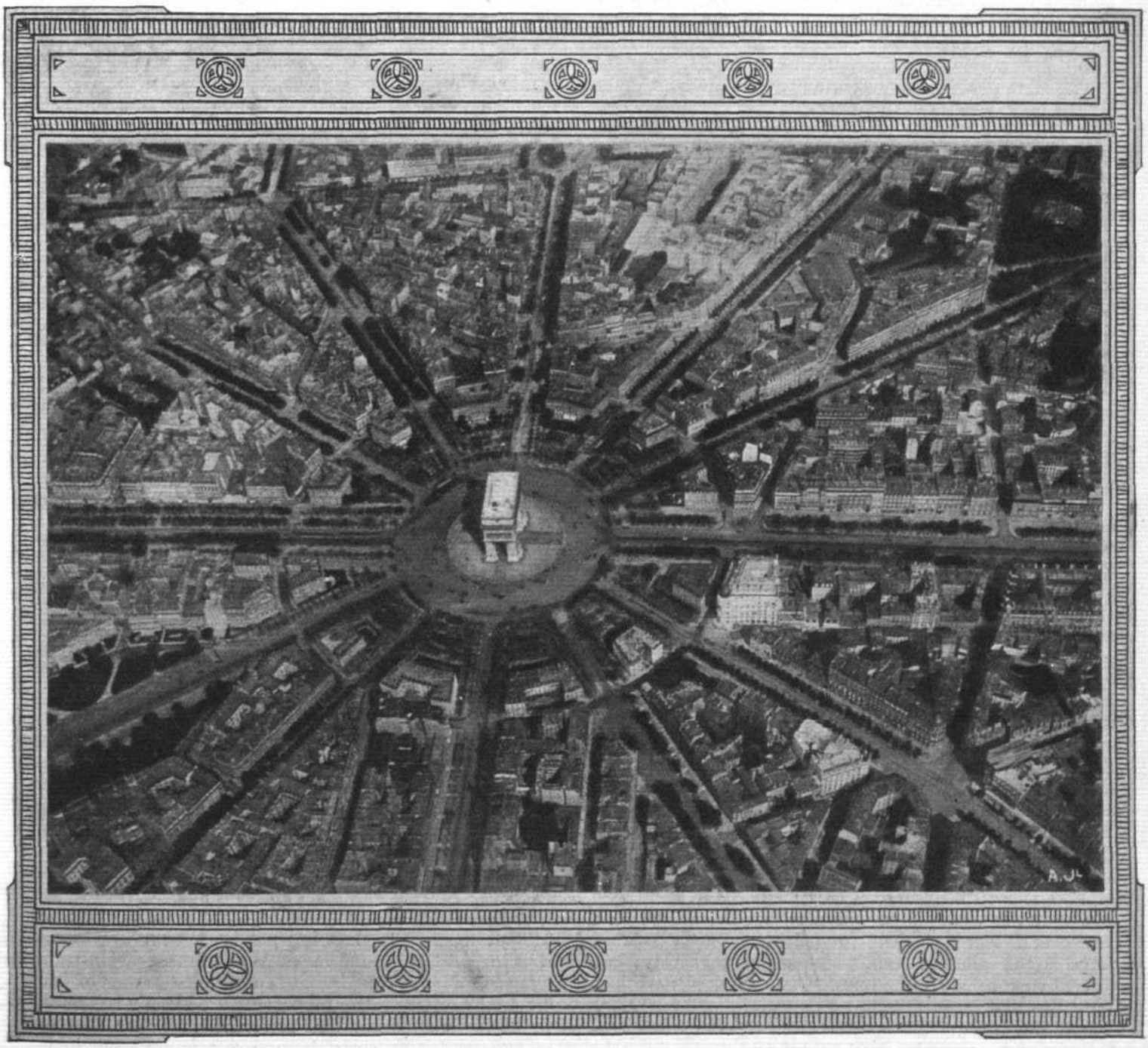

PARIS, AS SEEN FROM AN AIRSHIP.—Remarkable photograph taken from an airship, at a height of about 800 metres, of the Place de l'Etoile and the Arc de Triomphe, showing the radiating boulevards, all leading up to the famous archway.

Military Aspects of Flying.

At the time of the King of Spain's visit to Pau, Messrs. Wright intimated in the course of casual conversation that, apart from France, they did not foresee any immediate and widespread use for aeroplanes as purely sporting machines. In Britain and in the United States they thought that the near future of aeroplaning would rest rather with military requirements than with sportsmen, it being felt that when they came to realise what time and patience were needed to achieve flights under conditions favourable to the present early stage of the science that the purely pleasurable phases of mechanical flight would suffer relative neglect as being too few and far between. At the same time, the American pioneers pointed out that they had no knowledge of conditions in these islands, consequently they were merely giving expression to impressions which subsequent acquaintance with this country might cause them to remodel.

The mere idea is worth recording at the moment, however, if only because in the early stages of dynamic flight, when so much theory, and relatively so little fact, is available, every utterance of the very few men who can point to practical achievements must be deemed of the utmost weight to those interested in the science. Moreover, quite apart from the question as to whether or not the immediate sporting future of flying in Britain will be something of significant proportions, we have first to consider the contention that there is an immediate use for aeroplanes for military purposes. In this connection it must be had in mind that certain questions have been asked in Parliament lately, and one member of the House has made suggestions to the effect that no more public money should be expended on flying machines or on endeavours to evolve practical ones. Happily, far other views are entertained, however, in British Government circles, as Mr. Haldane's recent statements reveal; while even in Spain, which is generally considered to be one of the decaying and most conservative of nations, mechanical flight is being seriously considered. The object of King Alfonso's visit to Pau was that he might judge for himself concerning the present suitability of aeroplanes for scouting purposes, his Government having voted a sum of approximately £10,000 for the purchase of an aeroplane and a dirigible balloon. Doubtless the expert will reflect that the amount is very inadequate; but it approximates astonishingly closely to the moneys that have been expended hitherto by the Government yearly in this country on the military phases of aeronautics.

What was Wilbur Wright able to prove to the King of Spain? The accounts published in the daily press have merely touched on the significance of the demonstration, as anyone who chanced to witness it would be well aware. Briefly, it proved to the absolute satisfaction of all present that in the space of a few miles an aeroplane of the Wright type, flying at approximately 100 ft. off the ground, is invisible. And it must be borne in mind that now that the example in question has been fitted with larger and more efficient propellers its mean rate of travel is 39½ miles an hour, which means that it can get lost to view in seven minutes. As a fact, it took less time than that in the demonstrations given at Pont Long, where the biplane disappeared from view in one direction, namely, towards the Tarbes, and came in sight again 14 mins. later from quite another point of the compass.

When the construction of the machine is recalled, it is more easy to appreciate how readily it is lost to view. The planes lie horizontal, and the rudders are vertical and not broad. Thus the only "solid" things that the eye can dwell on when the machine is going from or coming towards the onlooker are the motor and the pilot. The four-cylinder petrol engine of 24-h.p. is a thing of quite insignificant depth, while a man seated is visible only by the height of his body, so that both conductor and engine become quickly dwarfed to the vision at any distance beyond a quarter of a mile away. There remains the practical question of the noise made by the machine. At present the exhaust is practically open, and on a still day one can undoubtedly hear it faintly for the distance of a mile and a half, but there is absolutely no reason why the same type of light silencer that is found efficient for motor cars should not be employed on a biplane which, in the case of the Wright machine, would be inaudible at the distance of a hundred yards, for the chains are kept constantly greased as they roll through their guides, and the screws turn at relatively a very slow rate.

These things being so, it was no boyish enthusiasm that caused the King of Spain to exclaim: "I have seen the machine of the future—for the aeroplane is that." At present the British public has had no opportunity of judging this point, but it is gratifying to know that during the course of the coming summer more than one aeroplane with which practical flights have been made abroad will be demonstrated with in this country. The successful advent of such machines will be of immense help to the development of aerial locomotion in these islands in that there is no means of education equally quick with that which can be received through the eye. The bioscope has proved a very useful stop-gap in this connection; but it is no more than a make-shift. Ocular demonstration in Britain will bear fruit in two directions, for it will give an immediate and practical impetus to the sporting phases of the movement, and it will mark the beginning of public appreciation of the significance of the new science as a means of increased military and naval efficiency. Doubtless the effect of the demonstrations will not stop there, for it is in the irony of things that the mass of the people rarely receive opinions with logical deliberation. Rather do they prefer to jump to conclusions. That is one of the chief dreads entertained by Messrs. Wright, who are always fearful lest folk should expect more of flying machines than they are actually capable of at present. For that reason they prefer to be silent as to what can or might be done. Instead, they do their best. That should be the motto of every patriot who takes an intelligent interest in the new science. And as Flight makes its appeal to those whose enthusiasm and knowledge are perhaps the chief present means of educating public opinion in Britain, it is needful to sound a note of warning against the dangers of sensationalism. In France some of the practical leaders of the movement are already lamenting the sensational tactics that are proving so successful for raising funds for aerial leagues. It is sincerely to be hoped that, when the time comes, the movement will not be injured in any such way in Britain.

THE HUMAN SIDE OF FLYING.

BEING AN ATTEMPT TO INTRODUCE THE READER TO MESSRS. ORVILLE AND WILBUR WRIGHT AT PAU.

By H. MASSAC BUIST.

(*Continued from page* 129.)

IF we knew the men who first went on the surface of the waters in boats, who first toiled into the bowels of the earth, who first trained the beasts of the pasture-lands to carry or to haul them along, would not the names of those men be immortal, as we know the meaning of that word, enduring to the uttermost reach of history? Yet men may walk on the dry lands, they may swim or float upon the waters, and they may even dive among them by the use of their own limbs. But the men who have enabled their fellows to invade the realm that Nature seemed to have set aside for birds and insects only, have done a far greater thing than those who first found the means of being borne on the face of the waters or of being drawn along the dry land without effort of their own. The Montgolfier Brothers and the Wrights have each given man the secret of riding the air. The Frenchmen learned how to float amid it, and the Americans have learned how to ride on it, while yet another genius, Marconi, has shown us how to think through it. When every King now reigning shall have been forgotten, the story of these amazing men will be a tale that will be part of the legends of the nations and that will be told to inspire children in their earliest years with the thought of noble deeds and grand achievements for the enlargement of the power of our race. If for no other reason than this, even the crudest attempt to put on record what manner of men Orville and Wilbur Wright are would be justified at this period. Happily for our purpose, however, there is such a fund of human interest that, apart altogether from their amazing achievement, one delights to know them.

If he followed the actor's calling Mr. Wilbur Wright would scarcely need any make-up to impersonate the Doge Loredano as portrayed by the brush of Giovanni Bellini. Again, there are those characteristics in his face that fit the very ideal of a cardinal; but his rapid utterances and sudden movements would be quite out of keeping with the part. Yet again, I saw in Spain a few days since a handsome, clean-shaven peasant who had a not dissimilar type of countenance, but one sought in vain for the activity, mental and bodily, which is characteristic of Mr. Wilbur Wright to such an outstanding extent that, no matter how distinguished the visitor to the Champ d'Aviation at Pont Long, the little man with the lean, weather-tanned face stands out for a master among his kind, and the figure in the whole field.

By comparison, Mr. Orville Wright does not possess any pronouncedly distinctive personality. That is to say, your eye would not be drawn to him among a crowd of men in the fashion in which it would instinctively dwell on Mr. Wilbur. Perhaps this is because Mr. Orville's features, including the jaw, are all small, while his eyes are not deep-set like his brother's and have somewhat of a dreamy expression, so that if you were asked to define the mental temperaments of the two brothers in a phrase you would say that Mr. Wilbur learned things through his eyes, while Mr. Orville got his knowledge by intuition, with which he is undoubtedly dowered to a rare degree. But you have only to appreciate the severe nature of his injuries and the amazing rapidity of his recovery, owing, the doctors agree, to his sheer determination to get well, to realise that the pale-faced little genius has more than an ordinary man's share of energy. Indeed, were it not that one instinctively contrasts him with Mr. Wilbur, one would gather that Mr. Orville is a man of very great physical activity. He is seldom still for more than a few minutes until, towards sundown, the ache of his heel may compel him to lie on a rug or to sit on a chair, but even so he continues to follow every detail of the flights and preparations for them, shouting instruction or advice from time to time, and being immensely proud that already he is able to climb over the tension wires to get at the motor. Despite the tremendous shock caused to his nervous system by his accident, he has flown in France with his brother, went up in a balloon only a week ago, and often it is plainly as much as he can do to restrain himself from taking control of the aeroplane and making a flight.

There never were men who took their work more enjoyably than these "*oiseaux artificiels*," merely because for them the joy of living lies in the pursuit of their fascinating ambition. "Oh, they have just had no end of fun learning to fly," says Miss Katherine Wright. "To hear them argue around and knock the bottom out of each other's ideas, then at the end of three hours to find Orv where Wil started off, and Wil where Orv began, is just the killingest thing imaginable, and makes them both burst out laughing—but it saved them no end of useless experiment." Anyone may gather as much who watches them at Pont Long, where never a flight is made but some fresh problem either is presented or is solved, so that you may see the story of their pioneer work being re-enacted morning after morning before the onlookers arrive from the town nine miles away.

And you find the secret of their success in the manner in which the problems are faced, as I will illustrate at the moment by citing a single example. Thrice the machine failed to rise when started in a certain wind and faced towards the Pyrenees. Somebody suggested that some of the ground beyond the 75-foot starting rail was so rough and abounding with

"Flight" Copyright Photo.

Characteristic.—The photographs usually published of Mr. Wilbur Wright do not truthfully portray his attitude towards cameras and the users of them. Here "Orv" is revealed to you. An instant before this snap was taken Mr. Wilbur was facing the sun, and engaged in an animated conversation with Mr. Orville on the subject of starting with the wind behind the aeroplane. The instant his eye caught the camera, however, he turned round. Note his bulging pockets filled with balls of string and so forth. Mr. Orville, you will observe, is not so coy; maybe he learnt the hopelessness of it in America.

hummocks as to present an undue obstruction, therefore would it not be better to remove a few of the mounds? Mr. Wilbur laughed. "No," he said, "if bumps are going to prevent us we might as well give up all claims to flying. We'll leave them there—and find out how to get over them. If the machine won't rise she ought to, and we'll just learn how to make her."

There you get the "keynote" to the whole character of the men. They no more seek to remove obstructions that nature places in the way than they dream of making the atmosphere more solid to afford more buoyancy to their machine. Obstacles are not removed, they are overcome; and the most infinite and patient pains are taken to trace everything back to its cause.

In this connection it may be recorded that never once during my visit did I hear anybody make any suggestion about anything that had not been either anticipated by Messrs. Wright or that was not worthless.

They are extremely satisfied with their ground at Pont Long. "The conditions for flying are here any amount better than they were in America," said Mr. Orville. "See there, where those trees make the nearest boundary? That's a thousand feet away, the greatest length I ever had to fly in; so I had to keep on the turn all the time. But here you can make a circle of seven or eight kilometres without getting out of the bounds of the grounds. That's grand for teaching."

"Say," quoth Mr. Wilbur, coming up at that moment, "I never knew such a place for shifting winds as this is. In America we used to be able to set the starting-rail and leave it so for six days at a time; and in the North of France it rarely shifted more than a quarter during the day. But here the cold wind comes down off the mountains in the morning, follows the sun right round, so"—describing a half-circle with a wave of the arm—"then goes back to the hills at night, so it's most everywhere in the course of the day. I guess I didn't start just now because it had shifted round to behind us."

"Don't matter, she ought to rise all right whether the wind's in front or behind," observed Mr. Orville. "I used to start regularly with the wind anything up to ten and even fifteen miles an hour behind me at Washington. I'll just get the anemometer and signal you with my stick when to let go. The breeze is dropping or rising from six to three miles an hour every few seconds this morning."

"Yah!" says Mr. Wilbur, with a jerk of his head and a humorous pursing of his lips, as he strides off in his tremendously energetic manner to superintend the adjustment of the starting tackle. And a few moments after, Mr. Orville, holding the anemometer high in his left hand, gave a shout as he let his stick drop to signal that the breeze had subsided to three miles an hour. Instantly Mr. Wilbur released the starting-catch, the big machine scudded forward as the weight dropped, and a moment later it was successfully launched in flight for the first time in Europe with the wind behind it at the actual moment of starting.

Mr. Orville turned to his sister and said, "Say, what have you brought out this morning—any more of those rolls?" "Which, the little, long ones?" asked Miss Wright. "Yes, those last were real nice," he replied. "And how are you getting on now?" was the next question, "Is the butter all right?" Yes, it's all right when it gets here," says Mr. Orville, "but that cook-fellow will leave it in the sun or round about the stove, and Wil can't abide melted butter. The minute the heat's got to it he's off it. But the chef fellow means well, though he doesn't seem to understand keeping butter cool and firm. He's awfully willing and for the rest makes us most comfortable." And that was the very human manner in which the first flight in Europe with the wind behind the aeroplane was received by one of its inventors, in whose talk technical topics alternate delightfully with the most commonplace domestic matters.

From the moment the brothers found themselves together again on a field where they could continue flying, Mr. Orville began to make extraordinarily rapid progress. As he feels the cold very much, he used to sleep at the hotel in Pau when he first went down; but he still seemed to grudge every hour spent away from his beloved machine and the companionship of his brother. So as soon as the establishment at Pont Long was put in order, and the dismantled aeroplane had been re-erected and was in readiness for flight, Mr. Orville made the experiment of camping out at Pont Long, where the "hangar" is undoubtedly the most luxurious combined living-quarters, workshop, and aeroplane shed that has ever been erected, the equipment including the celebrated chef and a special telephone line laid on by the Pau authorities. The result for Mr. Orville has been splendid beyond anticipations. Within a week he could climb quite easily over the wires to get at the engine, and now he will walk about by the half-hour together, quite oblivious that he has left his stick behind him. The fresh air and the congenial occupation are working wonders with his health.

A common enthusiasm makes teaching a delight alike to instructor and pupils. And it is a pleasure to observe that none of the "fledglings" ever dreams of taking any credit to himself. When anybody comments on their flights the invariable reply is to the effect that "I did nothing. It's such a wonderful machine, everything comes so easily with it. The only tax is on the attention, not on the muscles, which tire rather by our eagerness than from any strain to which we put them."

These "fledglings" are a delightful trio, full of contrasts. The Comte de Lambert speaks perfect English; M. Tissandier is making rapid progress in the tongue at

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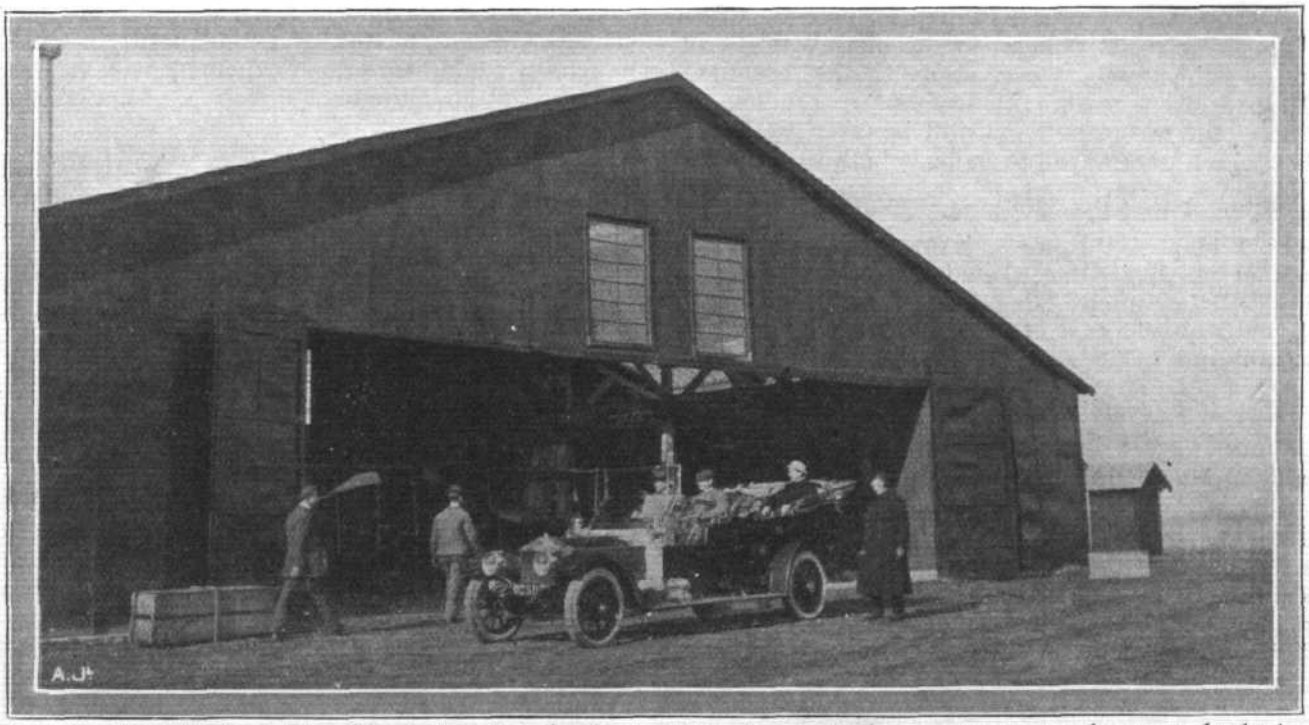
FLEDGLINGS THREE ON THE "FIELD OF FLIGHT."—Here you behold the pupils, namely, Captain "4038 Gérard"-ville, "Little Tissandier," and "Jonah" de Lambert. They have been engaged on Berlitz lessons at Pont Long with "Sister" (on the right), who has left "Wil" and "Orv" in the race to learn French.

an impromptu Berlitz school opened at the Hotel Gassion at Pau each night by Miss Wright; M. Georges Clemenceau—the six-foot son of the French Premier—the Comte de Castillon, and others; while Captain Lucas Gérardville does not understand our language. One notices, too, that neither of the "flying men" will trust himself to speak in French, hence, when the "Capt'n" has taken his seat on the vibrating aeroplane, Mr. Wilbur will be observed to stop the motor and cry out, "Mr. Berg, I want you." That gentleman having climbed over the slack, tangentially set wires that lead from the forward part of the main planes to the sides of the runners, "Teacher" proceeds: "I want you to tell the Capt'n that he's to try and keep not less than two metres off the ground, and not more than four. As soon as he goes more either way he's to let go and give over all control to me."

Master, pupils and public hereabout alike regard giving a lesson as being as ordinary a procedure as asking a friend to take a seat on a motor car and go for a ride. "Oh, yes," Mr. Wilbur will say, screwing up his eyes and shooting a quick keen glance at the horizon, "we'll certainly be flying this afternoon—about 4 o'clock." Close on that hour the machine starts. If you told anybody here that a degree of danger or of uncertainty attended mechanical flying in these early stages, they would ridicule the suggestion. We have all had the magic machine fly over our heads, and seen it travel voluntarily above a long line of carriages and cars, when any compulsory descents would spell instant disaster. But the descents are voluntary, not compulsory. The machine is brought to earth conveniently close to the pylone or at the very entrance to the shed, as the case may be; for it goes as absolutely whither the pilot wills as does a motor car. Horses neither shy nor become restive at the sight or sound of the gliding machine; nor do the patient oxen heed the approach, overhead passage, and flying away of it. Everybody and every animal that beholds it in use accepts human flight for the most natural and effortless thing in the world. Nor is it surprising, for the Comte de Lambert has had a score of lessons, representing a total of less than five hours' handling of the machine, and he is now competent to do everything save start and alight. Moreover, when Mr. Wilbur Wright came to Le Mans he had not had so much experience with a power-driven machine; hence, because in his preliminary flights the aeroplane undulated somewhat, it was erroneously concluded by certain theorists that such was the law of nature when riding the wind with an aeroplane so constructed. But to-day Mr. Wilbur flies with perfect smoothness, which the Comte de Lambert has nearly achieved.

Now that the brothers are world-famous and the cynosure of all eyes, it must be a happy reflection for their hale and aged father that he was immensely helpful to them in completing the final stages of their great discovery. His faith in the ability of his boys to achieve their purpose never wavered, and they tell you with pride that whenever their father went to see them during the experimental days he always brought good luck, which incidentally invariably extended to their having a good flight. "Father—he's just splendid," they will say with affectionate pride; and one sees as by reflection the renewed hope that must have come to them time and time again during the troublous days from the cheery presence and practical assistance of the grand old clergyman, who, for all that the presence of Miss Wright in Europe leaves him lonely at home, would not curtail her visit by a day. To the contrary, he is anxious for her to visit as many places of interest as possible. The link that ties the brothers is by no means the only one that is uncommonly strong in the Wright family. Indeed, as a family they are united to a rare degree. And that unity of purpose is manifest in their characters as it is in their activities.



The large Aero Dock at Pont Long, showing the large doors drawn back preparatory to taking out the biplane. Wilbur Wright is in the act of passing into the shed. The snapshot gives an admirable notion of his energetic walk. On the left are seen the windows of the dwelling rooms. On the right is the workshop where the machine with which the demonstrations to be made in Rome is partly in process of erection. The car in front is the Hon. C. S. Rolls' Rolls-Royce.

NEWS OF THE WEEK.

Royalty at the Aero Show.

IT is announced that it is the intention of H.R.H. the Prince of Wales to pay a visit to the Aero Show at Olympia, which will open on Friday next.

The Government and Flight.

ON Thursday of last week, Mr. Haldane, the Secretary of State for War, in his speech introducing the Army Estimates in the House of Commons, touched upon the subject of flight, and as this no doubt reflects the opinion of the Government upon the situation at the present time, we reproduce his statement in full.

After dealing with various matters relating to the re-organisation of the Army, Mr. Haldane said :—

"The Government have thought it right to consider the question of aerial navigation very carefully. It was referred to the Committee of Imperial Defence, and the Army and Navy experts came to definite conclusions as to what should be done. The First Lord of the Admiralty informs me that the Naval authorities are at present considering the pattern of the dirigible balloon they will order. The Army authorities are going in for dirigible balloons, and we are considering the best pattern. As to aeroplanes, we have begun negotiations with private inventors, and we think we have reached the stage when progress will be more rapid by dealing with private inventors than if we confine ourselves to the work of our own very capable officials, who have not the scope and range which many private inventors have. It will be a good while, however, before the aeroplane will be an efficient instrument in war."

Wright's Visit Postponed.

THE visit which the Aeronautical Society expected from Mr. Orville Wright this month, to receive their gold medal on behalf of his brother and himself, has, we learn, been postponed until later—June probably—by which time it is possible that Wilbur Wright himself might be able to find time to come over also. In the meantime, Orville and his sister are in Paris superintending the erection of the aeroplane which will be taken to Rome, whither Miss Katherine will accompany both her brothers.

King Edward and the Wrights.

ON Friday of this week, it was quite within the bounds of possibility that, should the circumstances be favourable, His Majesty King Edward, taking advantage of his close proximity to Pau, would motor over from Biarritz in order to witness a flight by Wilbur Wright.

The War Office and the Wrights.

WHEN the Wright Brothers do visit England, probably in May or June, it will be to accept the invitation of the War Office, which has been extended to them, in view of the very favourable reports which have been furnished by the British military officers who have been watching the experiments in France on behalf of our military authorities. It is quite on the cards that the flights will be made on the Aero Club's new ground at Sheppey.

Wilbur and Orville Wright—Doctors of Science.

THE Technical High School of Munich has conferred on the Brothers Wright the honorary degree of Doctor of Technical Science, in recognition of their services to flight.

The Wright Agency.

AS a result of the information which was made public last week relating to the first purchasers of the Wright aeroplanes, the Société l'Ariel has officially announced that all such sales have been made through them as exclusive concessionaires for the sale of the Wright flyers in France, and that the purchasers, whosoever they may be, must necessarily take delivery of their machines in that country.

Charpentier Aeroplane.

A YOUNG naval architect of St. Malo, named M. Charpentier, has constructed a flying machine which he has designed to be especially adaptable for marine use, his intention being that it should form part of the equipment of large ships. Floats have therefore been embodied as a permanent feature of the apparatus.

Santos Dumont and his "Demoiselle."

ON Tuesday, March 9th, Santos Dumont recommenced his experiments with his miniature monoplane, "La Demoiselle," when he succeeded in making a flight of 500 metres. A very high speed was necessary to effect a flight with such a small machine, and in landing the elevator was broken, but the damage was not serious and Santos Dumont himself was in no way hurt.

Goupy at Buc.

LIKE M. Bleriot, M. Goupy has also gone to the Buc aerodrome, and, moreover, he has taken with him a new machine, a biplane which he has had constructed by M. Bleriot but according to his own designs. In certain respects the machine resembles the Bleriot monoplane in constructional details, but it is a biplane. It weighs 300 kilogs., and is fitted with a 25-h.p. R.E.P. engine driving a four-bladed tractor screw in front; a biplane with a tractor screw is something of a novelty. At its very first attempt this new machine flew 200 metres at an altitude of 1½ metres, while on Tuesday of this week, when it made its second attempt, it flew the same distance at an altitude of 6 metres. M. Goupy piloted the machine himself.

Fournier Enters for the Cross-Channel Prize.

OUR contemporary, the *Daily Mail*, announce that they have received an entry from M. Fournier for their Cross-Channel Prize. M. Fournier is about to experiment near Calais as soon as he has taken delivery of his Voisin machine, which will be tested on the Issy ground.

In all, the *Daily Mail* have received eight entries for their contest, the names submitted being Mr. Moore-Brabazon, Captain Wyndham, MM. Antoinette, Voisin, Pischoff, Lejeune, Fournier, and Prince Bolotoff.

Bleriot No 11 Enlarged.

AS we announced in our issue of February 27th, M. Bleriot has increased the supporting surface of his short-span monoplane No. 11. The original area as published in our Table of Aeroplanes, which appeared in FLIGHT of January 2nd, was 13 sq. metres; the present value is 14 sq. metres. With this machine he flew a circular 1½ kiloms. at Buc on Tuesday.

More Entries for Monaco.

SIX further names have been received by the secretary of the Monaco Meeting as entrants for the flying competition. The Marquis d'Equevilly has entered an aeroplane having 25 sq. metres surface and a 25-h.p.

engine. M. Brissand, of Nice, is going to try and fly with a biplane, of which the surfaces have a greater fore-and-aft dimension than they have span. Mr. Wilkes has entered a biplane of 50 sq. metres surface, fitted with a 50-h.p. Gladiator engine. Messrs. Dennissel and Godvelle have jointly entered a machine which they call a "helicoplan," while another name on the list is that of M. Hausen, of Zurich.

Bordeaux-Paris Race.

IN the Flight section of *The Automotor Journal* of November 14th last year, we announced a proposition made by our contemporary, *L'Auto*, to hold a flight race from Bordeaux to Paris, a distance of about 592 kiloms. So far from in any way having dropped the subject, our contemporary is seeking by every means to push the scheme forward, and its latest move has been to organise a conference at Bordeaux, where they have arranged that Professor Marchis shall interest the inhabitants with lectures on flight.

The "Silver Dart" Flies 8 Miles.

CONTINUING the successful series of experiments, which we recorded last week, on Monday several very satisfactory flights were made with the biplane "Silver Dart," at Baddeck, Nova Scotia. Four short flights were made by Mr. McCurdy with the object of practising landing on the ice. The fifth and last flight of the day lasted for 11 mins. 15 secs., during which time a distance of about 8 miles was covered, the aeroplane flying from Dr. Graham-Bell's laboratory and back, passing *en route* over Baddeck Harbour. Practically all the inhabitants of Baddeck turned out to see these flights, and enthusiastically cheered the aviator on his descent.

Opel Prize.

THE name of Opel, through its association with the automobile movement, is almost as well known in this country as in Germany, and it will occasion no surprise that such a well-known sporting house should have founded a prize for flight. Their prize is to the value of £1,000 and will go to the first German aviator who flies in less than an hour from Frankfort to Russelsheim and back, making a descent at the latter place. The distance is about 40 kiloms., and it is specified that the attempt must be made between 10 o'clock in the morning and 10 o'clock at night on some day during the Frankfort Exhibition, which takes place from June to October. Should many competitors take part, the prize will go to the aviator who makes the fastest journey.

Another American Prize.

IN connection with the motor car races which will be held on the Florida beach, Daytona, from the 23rd to 26th inst., a prize of 500 dollars has been offered for the aeronaut who shall make a flight of 1 mile during the above mentioned period.

Pau Flying Ground.

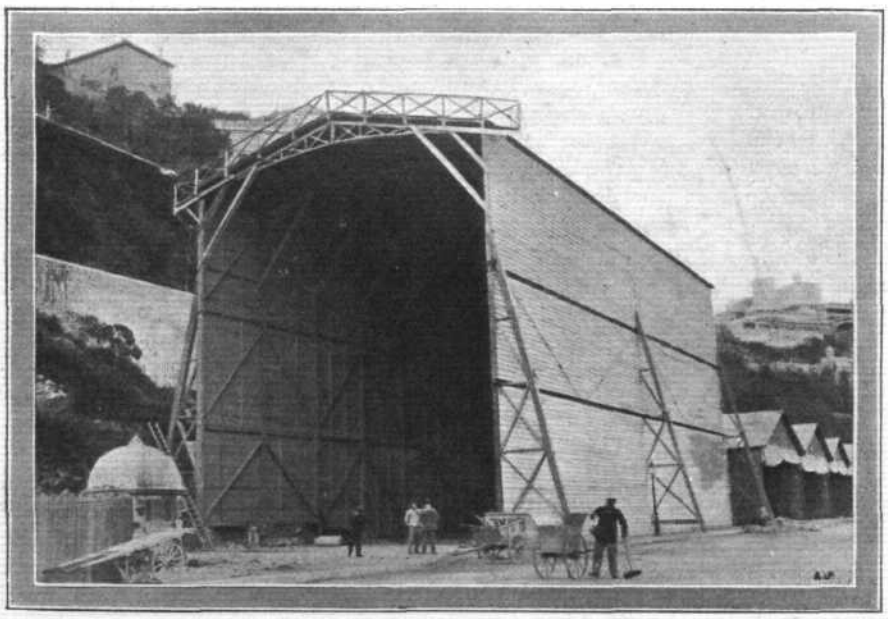
THE Bearn Aero Club has obtained a flight ground alongside that used by Wilbur Wright at Pau, and their action in inviting Frenchmen to come and fly there has elicited a letter of congratulation from the Committee of the Aero Club of France. It is the same as that which the members of the British Aero Club have been invited to use, as announced in the official notices in FLIGHT last week. The ground is situated 4 kiloms. from Wright's site, and it has the advantage of a track measuring about 800 metres in length, on which aeroplanes constructed to run on wheels can take off for the start. In the centre of this track is a circular space 350 metres in diameter.

Oberschwabischer Verein fur Luftschiffahrt.

MORE conveniently known as the Ulm Aero Club, at any rate to aviators in this country, but founded under the above-mentioned imposing title, the second aero club in Wurtemburg has just come into existence. It has been founded under the Presidency of His Excellency General von Uslar, Governor of Ulm, and already boasts of 200 members on its roll.

Flight Laboratory in France.

THE French Aero Club is receiving a good deal of support in its scheme to establish a laboratory in connection with flight, and already a list of subscribers have sent in their names. Another important offer has been received from the Society of Encouragement, who are willing to give the Aero Club a site for the laboratory on their Juvisy grounds.



AERO DOCKS AT MONACO.—In the foreground is the big shed for M. Jacques Faure's airship, and in the background are the erections for the flying machines which have entered for the big Monaco flight competition.

The Cost of "Nulli Secundus."

FIGURES are given in the Report of the Controller and Auditor-General on the Army Appropriation Account for 1907–8, which refer to the outlay on the aeronautical experiments at Aldershot, in which it appears that the total cost of building "Dirigible No. 1" was £7,283 4*s.* 6*d.*, the further experiments causing an additional outlay of £1,702 10*s.* 8*d.* The Experimental Account for the year reaches the figure of £2,471 2*s.* 10½*d.*, and includes the cost of building and testing the aeroplane. Altogether the total cost of articles constructed and tested was £20,445 16*s.* 2*d.*, as compared with £9,091 9*s.* 6*d.* for the previous year, and £8,810 6*s.* 2*d.* for 1905–6.

The Zeppelin Airships.

SOME confusion appears to have been caused by the process of renumbering which the Zeppelin airships have undergone. The one at present owned by the German Government is now known as "Zeppelin I," while the new one, which will probably be

finished early next month, will be known as "Zeppelin II." A third one is also under construction, and it is intended that it should be on view at the Frankfort Exhibition, to the guarantee fund of which Count Zeppelin has contributed £500.

The new permanent airship sheds at Friedrichshafen will, it is hoped, be ready by September, and it will then be possible to construct two airships simultaneously, the yearly output being ten or twelve.

"Zeppelin I" Flies.

On Tuesday last, "Zeppelin I," the German Government dirigible, made its first flights with a military crew over Lake Constance. Count Zeppelin was on board in the first trip, but in two subsequent flights he merely watched the proceedings from *terra firma*, an unusual rôle for him to play. Each of the three flights was of about an hour's duration, and all were apparently successful, although it was reported that the motor in the rear compartment was not working properly. Three flights were made on Wednesday, and, in spite of a strong wind, a high speed was attained, the airship covering about 115 miles in 2½ hours. Further experiments were carried out during the week.

Parseval Flyer.

Major Von Parseval, whose name is so closely associated with the German military dirigibles, has now constructed a flying machine on the monoplane system, and trials are expected to take place very shortly at Brandenberg. A feature of the flyer is that it has been adapted to rise from the water; in fact, the first trials will be made on the Scharmuetzel Lake.

Metz to be Headquarters.

It has been decided that the three German military dirigibles will go to Metz, which will thus become the headquarters of this section of the Army.

Austrian Dirigibles.

The military authorities in Austria have decided to have constructed two types of dirigible for military purposes. One will have a capacity of 1,500 cubic metres, and the other a capacity of 2,500 cubic metres. Both are to be of the semi-rigid type, and to be built to the designs of Dr. Raymond Nimfuhr, who is at present engaged on the construction of models.

American Dirigible Service.

The aerial transport schemes which have found such favour, on paper, in Germany, have spread to the United States, as we mentioned some time ago, and now a project is afoot to start a mail and passenger service between New York and Boston on the 1st of May. "Wind and weather permitting, April 1st" we should have thought would have been a more appropriate announcement.

Columbus Up to Date.

It is nearly 417 years ago since Christopher Columbus made the first trip across the Atlantic and discovered America, and, according to the *New York Herald*, it is now proposed by Mr. Joseph Brucker, of New York, that the trip should be duplicated, this time dirigible balloons taking the place of the sailing ships. Mr. Brucker is said to be already organising the expedition, and hopes it will be ready to start from Spain for the West Indies on July 25th, and, by utilising the trade winds, practically the same course as that taken by Columbus will be followed.

The Aerial Torpedo.

Work is progressing in connection with the aerial torpedo of which particulars were given in Flight of February 13th. The patent rights are in the possession of the Krupp firm, and it is said that a "tube" capable of firing a 100 mm. torpedo will only weigh 35 kilogs., and could therefore be easily carried on a dirigible or on a motor car. The principle has also been applied to marine life-saving appliances, and if a project which is afoot goes through successfully, this side of the problem will be worked out in England.

Cracks in the Air.

Lecturing on Saturday last at the London Working Men's College, Prof. A. W. Porter expressed a belief that it was possible to crack the air. He said that it might be thought that air was not a likely thing to crack, but neither was cobbler's wax, the liability of which to split under a sudden blow was well known. They had all heard the crack of the carter's whip, but which was it that cracked, the whip or the air? He thought it was the air. Lightning cracked the air, and the visible form of the flash followed the cracks.

French Aero Club Affiliation.

Up to the present time no fewer than 21 associations are affiliated to the Aero Club of France, and nothing could perhaps better indicate the popularity of aeronautics generally, on the Continent, than this. It is an object-lesson in uniformity, at any rate, and we hope to see the same sort of alliances take place in this country when the time is ripe.

French Ballooning Prizes.

The Aero Club of France has decided to provide four cups for ballooning competitions among its members this year. These cups will bear the names of pioneer aeronauts, and will be known as the Charles, the Robert, the Pilatre de Rosier, and the d'Arlande. A special cup will also be available for competition among affiliated clubs and will carry with it a prize of 600 francs and a second prize of 200 francs.

Antwerp Aero Club.

An aero club has been founded at Antwerp, and among the founder members are the Baron de Caters, M. Wilford, who has bought a Wright flyer, and M. Vandenberg, who has invented a machine of his own. There is also a strong military section in the club.

The Busy Bee as Teacher.

Lecturing before the Royal Photographic Society recently, Mr. F. Martin Duncan expressed the opinion that they might learn a great deal of valuable information from a series of photographs of flying insects. He instanced the wings of the bee and wasp as being of particular interest. They are marvellous for the small compass into which they can be packed and for the extent of their protraction when the insect is on the wing.

Aeroplane Material.

Very special attention has been paid to lightness, combined with strength, in some new quality sheeting for aeroplanes which has been recently introduced by the Continental Tyre and Rubber Co., Ltd. Trials have been made with material other than indiarubber proofed sheeting, but in most cases such trials have proved anything but a success, and the new "continental" material appears to be specially suited for the purpose.

AERO CLUB OF THE UNITED KINGDOM.

OFFICIAL NOTICES TO MEMBERS.

Annual General Meeting.

The Ninth Annual General Meeting was held at the Club premises, 166, Piccadilly, on Thursday, March 10th, the chair being occupied by Mr. Roger W. Wallace, K.C.

The Chairman, after dealing with the balance-sheet for the year, referred to the large increase in the membership of the Club. He said the outcome of the work which had been carried on for the last nine years was only now becoming apparent, that public interest was at last being shown in connection with aeronautics, and that the national importance of the whole question was obtaining gradual recognition in this country. For many years the Aero Club has kept closely in touch with the various Continental developments, and has, through the Federation, taken a considerable share in influencing the progress of aerial navigation.

At the annual meeting of the International Federation which was held in London in May, 1908, many important questions were discussed, and early this year an extraordinary conference was held at the Hotel Ritz, which dealt with the organisation of the Federated Clubs and matters of general interest to aeronautics.

He said it was not necessary for him to refer to the numerous prizes which were now available for competition by the members of the federated clubs, as these had been fully set out in the public Press from time to time.

He announced that in the course of next week the first English Aero Exhibition is to be held at Olympia under the auspices of the Aero Club. The Exhibition will be fully representative of all classes of aerial craft, and the many appliances connected with the industry. Great interest had been taken in the recent Aero Exhibition in Paris, and he hoped and anticipated that an equal or even greater interest might be displayed by the public here in the forthcoming Show.

The Club had experienced very great difficulty in selecting a suitable ground for carrying out experiments. They had, however, now acquired a very desirable ground in the Island of Sheppey, which fulfils all the essential requirements for aeroplane practice. Buildings and workshops are now in course of construction. Aeroplane sheds will be ready and the ground will be open for trials towards the end of the present month. The War Office has kindly given permission to the Aero Club to use any Government ground for trials.

Many members of the Club are acquiring flying machines, and the Committee are arranging with those members to place their services and the machines at the disposal of the Government. A properly organised corps will be formed as soon as arrangements are fully completed.

The Gold Medal of the Club was awarded to the Brothers Wright. It was impossible for them to come to England at the time, and a deputation of the Committee presented the medal to them in Paris in November last. In order to encourage the progress of aviation generally, the Aero Club League has been formed with a subscription of 10*s*., and facilities are given to its members to exercise the privileges which have been obtained for them by the Aero Club.

During the past year various competitions for balloons were held at Hurlingham, and the Club also took part in several International contests abroad, the results of which proved that English aeronauts are quite competent to take a foremost position in these contests.

In order that members might have weekly notices of all that was going on in this country and abroad in connection with aerial navigation, the Committee have appointed FLIGHT the official organ to the Club, and he was glad to say that the journal had already a very large circulation.

He thanked the Committee of the Club for their devotion to the interests of the Club, and he was pleased to say that all those who at present had been in an aeroplane in actual flight were members of the Aero Club.

Committee for 1909.

The result of the ballot for the Committee for 1909 is as follows :—

Griffith Brewer.
Ernest C. Bucknall.
Frank H. Butler.
Vice-Admiral Sir Charles Campbell, K.C.M.G., C.B., D.S.O.
Col. J. E. Capper, C.B., R.E.
Major C. de W. Crookshank, R.E.
Martin Dale.
John Dunville.
Capt. A. H. W. Grubb, D.S.O., R.E.
Professor A. K. Huntington.
V. Ker-Seymer.
J. T. C. Moore-Brabazon.
C. F. Pollock.
Hon. C. S. Rolls.
Viscount Royston.
J. Lyons Sampson.
Stanley Spooner.
Roger W. Wallace, K.C. (Chairman).

Aero Exhibition at Olympia.

The Aero Exhibition at Olympia, held by the Society of Motor Manufacturers under the auspices of the Aero Club of the United Kingdom, will open on Friday next, the 19th inst., and terminate on the 27th. Members of the Aero Club will be admitted free on production of their Aero Club membership cards. A room will be placed at the disposal of the members during the Exhibition.

Model Flying Machines at Olympia.

The model section at the Aero Exhibition at Olympia has received strong support, and 81 exhibits have been promised.

Exhibits will be received from Monday morning, March 15th, until Thursday, March 18th, 1909, and must be in position on the latter day; none can be received before or after these dates.

Every model must bear prominently the name of the exhibitor. Number cards corresponding with the official catalogue will be issued to exhibitors. Stands will be provided for all models.

Exhibitors must clearly note when sending cases and packages by rail, that they must be carriage paid, and also clearly notify whom they are for, and be addressed to the Aero Club, c/o Aero Exhibition, Olympia, Kensington, London, W.

New Members.

The following new members have been elected :—

H. Barber.
Sydney D. Begbie.
R. W. Hogarth.
T. O'B. Hubbard.
John Henry Knight.
J. G. Lorrain.
Sir Clifton Robinson, C.E., J.P.
Clifton Robinson, jun.
Malcolm Seton-Karr.
Col. The Marquis of Tullibardine, M.V.O., D.S.O.

HAROLD E. PERRIN,
Secretary.

The Aero Club of the United Kingdom,
166, Piccadilly, W.

CORRESPONDENCE.

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

AERONAUTICAL BAD LANGUAGE.

To the Editor of FLIGHT.

SIR,—In the Correspondence columns of Feb. 27th, it appears that the use of the word "aeroplane" instead of "flying machine" is further condemned—it is to be hoped that eventually it will be discarded by aviators generally in this sense; the name of a part of a machine should never be used to designate the whole. Flying machine or flier is a definite term to describe the complete machine, whilst an aeroplane is but a portion of such an apparatus, and usually is only a very small item of the supporting or steering surfaces. Surely this is logically reasonable.

The question is asked, what was the hash manufactured by the International Aero Commission. Well, what do you think of this as a sample of suitable terms for the various forms of machines for navigating the air? :—

Aerostat, aeronaut, aeronat, aernef, aeroplane, do these look distinctive or desirable? How were they evolved? By a learned scientific committee who carefully considered what they were about or the resultant of cerebral confusion by a fellow afflicted with D.T. It looks like the latter. I regret to say this was not the case, or it might be forgiven.

Fundamental work on all scientific subjects should be thoroughly sifted, systematized and directed in the right course, not lazily allowed to drift haphazard under mob guidance, although in the first letter, despatch of this business was urged, feeling matters aeronautical were rapidly forging ahead. This merely referred to the primary compilation, then after, by careful deliberation, your numerous readers could undoubtedly place before you several words quite suitable for each case from which you could select those deemed best.

In the glossary, p. 103, from "aeroplane" to "triple monoplane" (triple monoplane!) require revision, also the terms "wing" and "length," both commented on by other correspondents. Length applied to what in a flying machine is usually the shortest distance appears contradictious. Perhaps some verbal inventor will assist by giving us just the word that is wanted, distinctive and preferably of one syllable. Your "tilt," "dip," "span," are perfect examples of what is needed, as are most of the words given in your brief glossary. In electrical nomenclature, we have ampère, volt, farad, &c., immortalising the philosophers and discoverers of that branch of science. Similar methods might be applied to aeronautical science when required, using the names of those who had done real progressive scientific work. There are many to choose from—Moy, Wenham, Cayley, Stringfellow, Wright, Chanute, Ader, Pilcher, Maxim, Langley, Lillienthal, &c.

As the chosen vehicle of the Aero Club you may not feel disposed to tolerate a too intrusive interference with the views of that Committee from which possibly part of this glossary has emanated, but what little has been said upon the matter is with an earnest desire to place the subject on a sound scientific and useful basis. Perhaps now some of the many well-known experimenters will give their views, which certainly will carry more weight than my attempt to elucidate the same. *Au revoir.*

Farnborough, Kent. C. H. M. A. ALDERSON.

[Mr. Alderson's suggestion that our Glossary of Terms in FLIGHT partly emanated from the Aero Club Committee is not correct; as a matter of fact, the glossary was actually in type at the time of the publication of the first issue of FLIGHT, it having been compiled as the result of our visit to the Paris Salon. So far from resenting criticism of the glossary or any other matters which appear in FLIGHT, we invite it, for the evidence which it gives of a keen interest in affairs generally among our readers.. Our position as official organ of the Aero Club carries with it no restrictions whatever upon our freedom of editorial comment, and, as we explained in our first leader, the conduct of FLIGHT will always be on the same independent and unbiased lines as has ever characterised the parent *Automotor Journal*.—ED.]

A MODEL ENGINE DESIGN.

To the Editor of FLIGHT.

SIR,—I am sorry Mr. Montford Kay should think so badly of my screw engine. Personally, I did not find any of the disadvantages he mentions when experimenting with the engine. Sixteen years ago I had a large working model constructed, not at an excessive cost, if I remember rightly. There was extremely little friction comparatively, and, what was particularly noticeable, an absence of vibration, owing to the principal motion being rotary, the only reciprocating parts being the pistons and cages on the screw, thereby preventing any loss of momentum at the dead centres. With regard to the lubrication, the screwed shaft may run in an oil bath, if so desired, for aeroplanes. I cannot but think that an adaptation of the screw engine could be well contrived, as the slow movement of the working parts, the great speed of the shaft and propeller, with a total absence of gearing, all tend to make the engine an ideal one for the purpose. I still have the model, and I daresay it would still run if it were cleaned and oiled.

I am, Sir, yours faithfully,

Grange-over-Sands. E. B. POTTER.

PROPELLERS AND MOTORS.

To the Editor of FLIGHT.

SIR,—Despite the monotony of this correspondence, I shall continue to defend myself against the unjust, invidious attacks of Mr. Kay.

I have never yet tried to evade the main issue, however it may "appear" to your correspondent, and I think no other person would accuse me of "word-twisting" generalities. I am *certain* that I have "a propeller of great efficiency," and it is not mere assertion.

There is no *must* about having an aeroplane to duly and fairly test a propeller—although, as it happens, mine *has* been successfully tried on an aeroplane, its high efficiency and general excellence being publicly testified to in *Engineering* of June 12th last, besides in other journals. Previously, I had one (of 6 ft. diam. and 11 lbs. weight, all steel) most carefully and fully tested as follows: By means of an electric motor, a dynamometer, a revn. counter, an anemometer, and exact readings of all instruments, the readings of electrical output being taken both when running "light" and with propeller on. The effective pitch deduced from these data was then compared with the actual pitch, and showed an efficiency of 85 per cent. (15 per cent. slip). Thus, the difference in the efficiency of a "Hollands" and a "Voisin," both on an aeroplane, is 45 per cent., the latter being known to have only 40 per cent. The experiments of Maxim, Curtiss, and others, including myself, have demonstrated that the thrust of aerial propellers is the same, whether running under stationary conditions or when advancing. If anyone disputes this, let him either look up the authorities (published) or fairly try it himself, however he may theorise.

Wilbur Wright has done so admirably because he has an excellent propeller, and I freely admit that, next to my own, it is the best aerial propeller ever produced (about 75 per cent. efficiency), and if only made *in steel* it would be its equal.

Having had the privilege of long correspondence with the Brothers Wright (at intervals for the past six years), I offered them my propeller before they left the States, but, rather naturally, perhaps, as they found their own so good, they elected to "leave well alone," though without disputing the merits of mine.

The inefficiency of the Voisin propeller forces them to carry *enormous power* to "level things up," but with the extra weight—50 h.p. where 25 h.p. should suffice—the Wrights have only 27 h.p.

I admire the performances of Mr. Moore-Brabazon, handicapped as he is, too, and I may add that I am supplying him with one of my propellers. Your correspondent—with characteristic courtesy—stigmatises me as "perversely dense," though certainly with an alternative which I prefer to take.

Yours faithfully,

Feb. 27th, 1909. SIDNEY H. HOLLANDS.

FLIGHT.

44, ST. MARTIN'S LANE. LONDON, W.C.

Telegraphic address: Truditur, London. Telephone: 1828 Gerrard.

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NOTICE.—Advertisement instructions should reach the office, 44, St. Martin's Lane, W.C., by first post, Thursday. The latest time for receiving small alterations for Advertisements is 12 noon, Thursday. No alterations can be made after that hour.

PRESENT STATUS OF MILITARY AERONAUTICS.

By GEORGE O. SQUIER, Ph.D., Major, Signal Corps, U.S. Army.

(*Continued from page* 138.)

ENGLAND.

Military "Dirigible No. 1" (Fig. 6).

THE gas-bag of this airship was built about five years ago by Colonel Templar, formerly in command of the aeronautical establishment at Aldershot. His successor, Colonel Capper, built the mechanical part during the spring and summer of 1907, with the assistance of Mr. S. F. Cody, a mechanical engineer. It was operated by Colonel Capper as pilot, with Mr. Cody in charge of the engine. Several ascents were made at Aldershot. In October, 1907, they made a trip from Aldershot to London, a distance of about 40 miles, landing at the Crystal Palace. For several days the rain and wind prevented attempting the return journey. On October 10th a strong wind threatened to carry away the airship, so the gas-bag was cut open by the sergeant in charge.

Gas-Bag.—This is made of eight layers of gold-beater's skin. It is cylindrical in shape with spherical ends. Volume, 84,768 cub. ft.; length, 111½ ft.; maximum diameter, 31½ ft. The elongation, therefore, is only about 3⅝. There is no ballonette, but, due to the toughness of the gold-beater's skin, a much higher pressure can safely be maintained than in gas bags of rubber cloth. Without a ballonette, however, it would not be safe to rise to the heights reached by the "Patrie."

Valves.—The valves are made of aluminium, and are about 12 ins. in diameter.

Suspension.—In this airship they have succeeded in obtaining a "long" suspension with a short boat-shaped car, a combination very much to be desired, as it distributes the weight over the entire length of the gas-bag, and gives the best form of car for purposes of observation, and for manœuvring on the ground. To obtain this combination they have had to construct a very heavy steel framework, which cuts down materially the carrying capacity, and, moreover, this framework adds greatly to the air resistance. This is the only airship in Europe having a network to support the car. In addition four silk bands are passed over the gas-bag, and wires run from their extremities down to the steel frame. This steel frame is in two tiers; the upper is rectangular in cross-section, and supports the rudder and planes; the lower part is triangular in cross-section, and supports the car. The joints are aluminium.

The Car.—This is of steel, and is about 30 ft. long. To reduce air resistance, the car is covered with cloth.

Motor.—A 40-h.p. to 50-h.p. 8-cyl. Antoinette motor is used. It is set up on top of the car. The benzine tanks are supported above in the framework. Gravity feed is used.

Propellers.—There are two propellers, one on each side, with two blades each, as in the "Patrie." They are made of aluminium, 10 ft. in diameter, and make 700 r.p.m. The transmission is by belt.

Stability.—This is maintained by means of planes. At the extreme rear is a large fixed horizontal plane. In front of this is a pair of hinged horizontal planes. Under this is the hexagonal-shaped rudder. It is balanced. Two pairs of movable horizontal planes, 8 ft. by 4 ft., each placed at the front serve to guide the airship up and down, as in the "Patrie" and "Ville de Paris." These planes have additional inclined surfaces, which are intended to increase the stability in a vertical plane. All these planes, both fixed and movable, are constructed, like kites, of silk stretched on bamboo frames. The guide-rope is 150 ft. long. Speed attained, about 16 miles per hour. This airship, with a few improvements added, has been in operation the past few months. The steel framework connecting the gas-bag to the car is now entirely covered with canvas, which must reduce the resistance of the air very materially. The canvas covering enclosing the entire bag serves as a reinforcement to the latter, and at the same time gives attachment to the suspension underneath. It is reported that a speed of 20 miles an hour has been attained with the reconstructed airship.

A pyramidal construction similar to that on the "Patrie" has been built under the centre of the car to protect the car and propellers on landing. A single movable horizontal plane placed at the front end of the car, and operated by the pilot, controls the vertical motion.

GERMANY.

Three different types of airships are being developed in Germany. The "Gross" is the design of Major Von Gross, who commands the balloon battalion at Tegel, near Berlin. The "Parseval" is being developed by Major Von Parseval, a retired German officer, and the "Zeppelin" is the design of Count Zeppelin, also a retired officer of the German Army.

The "Gross."

The first airship of this type made its first ascension on July 23rd, 1907. The mechanical part was built at Siemen's Electrical Works in Berlin; the gas-bag by the Riedinger firm in Augsburg.

Gas-bag.—The gas-bag is made of rubber cloth furnished by the Continental Tyre Co., similar to that used in the "Ville de Paris." It is diagonal thread, but there is no inner layer of rubber, as they do not fear damage from impurities in the hydrogen gas. Length, 131½ ft.; maximum diameter, about 39⅓ ft.; volume, 63,576 cub. ft.; the elongation is about 3⅓. The form is cylindrical with spherical cones at the ends, the whole being symmetrical.

Suspension.—The suspension is practically the same as that of the "Patrie." A steel and aluminium frame is attached to the lower part of the gas-bag, and the car is suspended on this by steel cables. The objection to this system is even more apparent in the "Gross" than in the "Patrie." A marked dip along the upper meridian of the gas-bag shows plainly the deformation.

The Car.—The car is boat-shaped like that of the "Patrie." It is suspended 13 ft. below the gas-bag.

Motor.—The motor is a 20-24-h.p. 4-cyl. "Daimler-Mercedes."

Propellers.—There are two propellers, 8½ ft. in diameter, each having two blades. They are placed one on each side, but well up under the gas-bag near the centre of resistance. The transmission is by belt. The propellers make 800 r.p.m.

Stability.—The same system, with planes, is used in the "Von Gross" as in the "Patrie," but it is not so nearly well developed. At the rear of the rigid frame attached to the gas-bag are two fixed horizontal planes, one on each side. A fixed vertical plane runs down from between these horizontal planes, and is terminated at the rear by the rudder. A fixed horizontal plane is attached on the rear of the gas-bag as in the "Patrie." The method of attachment is the same, but the plane is put on before inflation in the Gross airship, afterwards in the "Patrie." The stability of the Gross airship in a vertical plane is reported to be very good, but it is said to veer considerably in attempting to steer a straight course.

The many points of resemblance between this dirigible and the Lebaudy type are worthy of notice. The suspension or means of maintaining stability, and the disposition for driving, are in general the same. As first built, the "Gross" had a volume of 14,128 cub. ft. less than at present, and there was no horizontal plane at the rear of the gas-bag. Its maximum speed is probably 15 miles per hour. As a result of his experiments of 1907, Major Von Gross has this year produced a perfected airship built on the same lines as his first, but with greatly increased volume and dimensions. The latest one has a volume of 176,000 cub. ft., is driven by two 75-h.p. Daimler motors, and has a speed of 27 miles per hour.

On September 11th of this year the Gross airship left Berlin at 10.25 p.m., carrying four passengers, and returned the next day at 11.30 a.m., having covered 176 miles in the period of a little over 13 hours. This is the longest trip, both in point of time and distance, ever made by any airship returning to the starting point.

The "Parseval."

The Parseval airship is owned and controlled by the Society for the Study of Motor Balloons. This organisation, composed of capitalists, was formed practically at the command of the Emperor,

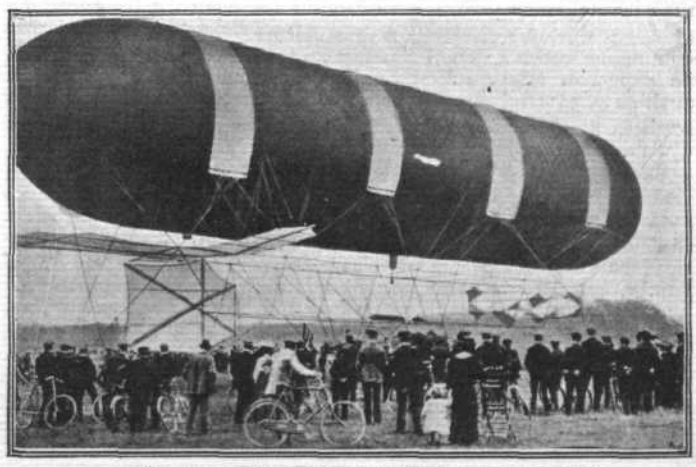

Fig. 6.—The British "Dirigible No. 1."

who is very much interested in aerial navigation. The Society has a capital of 1,000,000 marks, owns the Parseval patents, and is ready to construct airships of the "Von Parseval" type. The present airship was constructed by the Riedinger firm at Augsburg, and is operated from the balloon house of this Society at Tegal, adjoining the military balloon house.

The gas-bag is similar in construction to that of the "Drachen" balloon, used by the army for captive work. Volume 113,000 cub. ft., length 190 ft., maximum diameter 30½ ft. It is cylindrical in shape, rounded at the front end and pointed at the rear. The material was furnished by the Continental Tyre Company. It is diagonal thread, weighing about 11½ ozs. per sq. yd., and having a strength of about 940 lbs. per running foot. Its inner surface is covered with a layer of rubber.

Ballonettes.—There are two ballonettes, one at each end, each having a capacity of 10,596 cub. ft. The material in the ballonette weighs about 8½ ozs. per sq. yd., the cotton layers being lighter than in the material for the gas-bag. Air is pumped into the rear ballonette before leaving the ground, so that the airship operates with the front end inclined upward. The air striking underneath, exerts an upward pressure, as on an aeroplane, and thus adds to its lifitng capacity. Air is pumped into the ballonettes from a fan operated by the motor. A complex valve just under the middle of the gas-bag enables the engineer to drive air into either or both ballonettes. The valves also act automatically, and release air from the ballonettes at a pressure of about 0·9 in. of water.

In the middle of the top of the gas-bag is a valve for releasing the gas. It can be operated from the car, and opens automatically at a pressure of about 2 ins. of water. Near the two ends, and on opposite sides, are two rip strips controlled from the car by cords.

Suspension.—The suspension is one of the characteristics of the airship, and is protected by patents. The car has four trolleys, two on each side, which run on two steel cables. The car can run backwards and forwards on these cables, thus changing its position with relation to the gas-bag. This is called "loose" suspension. Its object is to allow the car to take up, automatically, variations in thrust due to the motor, and variations in resistance due to the air. Ramifications of hemp rope from these steel cables are sewn on to a canvas strip which, in turn, is sewn on to the gas-bag. This part of the suspension is the same as in the Drachen balloon. The weight is distributed over the entire length of the gas-bag.

The Car.—The car is 16·4 ft. long, and is built of steel tubes and wires. It is large enough to hold the motor and three men, though four or five may be taken.

Motor.—The motor is 110-h.p. Daimler-Mercedes. Sufficient gasoline is carried for a run of twelve hours.

Propeller.—This propeller, like the suspension, is peculiar to this airship, and is protected by patents. It has four cloth blades which hang limp when not turning. When the motor is running, these blades, which are carefully weighted with lead at certain points, assume the proper position due to the various forces acting. The diameter is 13¾ ft. The propeller is placed above the rear of the car near the centre of resistance. Shaft transmission is used. The propeller makes 500 r.p.m. to 1,000 of the motor. There is a space of 6½ ft. from the propeller-blades to the gas-bag, the bottom of the car being about 30 ft. from the gas-bag. This propeller has the advantage of being very light. Its position, so far from the engine, necessarily incurs a great loss of power in transmission.

The steering-wheel, at the front of the car, has a spring device for locking it in any position.

The 1908 model of this airship was constructed for the purpose of selling it to the Government. Among other requirements is a 12-hour flight without landing, and a sufficient speed to manœuvre against a 22-mile wind. A third and larger airship of this type is now under construction.

(To be continued.)

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DEFENCE OF HARBOURS AGAINST NAVAL AIRSHIPS.*

By Colonel F. G. STONE, p.s.c.

THE employment of motor airships in the navy is seriously engaging the attention of at least one Continental power, and the article on this subject by Captain Neumann, Instructor in the German Airship Battalion, which appeared in the July number of *Marine Rundschau*, is well worthy of study. A translation of the article, communicated by the Director of Naval Intelligence, commenced in the November number of the *Journal of the Royal United Service Institution.*

The employment of airships at sea is attended with greater difficulties than over land. These difficulties are due principally to two causes :—

1. Necessity for greater endurance, due to the greater distances to be covered in naval scouting and to the prevalence of stronger air currents which have to be encountered at sea.

2. Difficulty of designing a "parent" ship capable of carrying, launching, and taking on board after flight such huge and delicate structures.

As regards 1, it is evident that airship scouting at sea must be pushed to much greater distances than over land, owing to :—

a. The ease with which one fleet can evade another at sea, as compared with the case of armies on land.

b. The rapid movements of fleets, as compared with armies ; a fleet can cover a distance in an hour which can scarcely be accomplished by an army in 24 hours.

Captain Neumann says : "In order to form an opinion regarding the eventual employment of airships in the navy for long-distance scouting, we can with safety provisionally assume that a maximum continuous working period of 20 hours with two motors may shortly be expected. . . . Assuming an increase in the speed of airships to 33·5 miles an hour as equally attainable, then with this working period of 20 hours the endurance in calm weather will be 671 miles."

Such an airship would have a capacity of about 500,000 cub. ft. Colonel Capper estimates that an airship of this capacity, with a radius of action of 500 miles, and a speed of 30 miles an hour, could carry 4,480 lbs. of bombs at a height of 5,000 ft., and that a non-rigid balloon of the same gas capacity could carry 11,200 lbs. of bombs, but that (as regards (2) above) both of these would be too huge and unwieldy to be carried on and launched from board ship, although in fair weather they might replenish stores of gas, petrol, and explosives at sea. He considers that an airship of 100,000 cub. ft. capacity is the largest that could be carried on board ship. Such an airship need not be rigid for the purpose of reconnoitring and attacking harbours ; but even then its capacity for offence would be limited—perhaps 1,200 lbs. of bombs, and a sufficient supply of petrol for three or four hours.

From the foregoing it may be concluded that our harbours in the south of England are all open to attack by the larger type of airship, if starting from a land base in the north of France ; if starting from Belgium, it might be considered that Portland was about the limit, or, at a stretch, Devonport. From Holland, Portland would certainly be the limit ; and, from the nearest point in Germany, Portsmouth could scarcely be reached, if the airship was required to return to German territory. Malta and Gibraltar can be reached from land bases on French territory in Africa, and Malta can also easily be reached from Sicily. The reconnaissances beyond the radius of such airships can only be carried out by them in combination with a fleet affording facilities for supplies and repairs by means of "parent" ships ; that such supply and repair service can only be effected in fair weather ; and that the only reliable airship which can be used in conjunction with the Navy is one which can actually be stored on board a "parent" ship, launched from it, and taken back on board when it returns from its flight in moderate weather. Finally, Colonel Capper is of opinion that such a ship cannot exceed 100,000 cub. ft. capacity. Captain Neumann has not so far dealt with the question of the "parent" ship in relation to the size of the airship, but he seems to assume that the difficulty of transporting the larger type of airship, and basing its action on a "parent" ship, is not insuperable. In any case, it is clear that an airship for harbour reconnaissance and attack can be more easily carried on board ship than one intended for long-distance scouting, inasmuch as it requires far less endurance, and does not require a rigid envelope ; ballast can be replaced by bombs. We may rest assured that the difficulties in the way of employing these new engines of offence will be quickly overcome by a Power which takes these things seriously. Captain Neumann says : "It would be impossible for our Navy to continue to neglect the question." It is, therefore, equally incumbent upon us to perfect a system of defence and counter-attack in readiness for all eventualities.

The reconnaissance and attack of harbours and dockyards may be considered under three heads :—

1. Reconnaissance of harbours within sight of "parent" ship.

2. Transmission of information by "wireless" from a position of observation to ships engaged in bombarding the harbour or dockyard, &c.

3. Dropping bombs on certain areas which cannot effectively be attacked by ships' guns.

The first of these presents the least difficulty from the enemy's point of view. Under the second heading the naval airship will have to expose itself more, since it will be impossible to observe the

* Abstract of a Paper read before the Royal United Service Institution on Wednesday, 10th March.

fall and effect of the fleet's projectiles and communicate results unless the airship occupies an almost stationary position at a moderate height. Under the third heading, that of dropping bombs, we have really to deal with the airship as a new and dangerous means of actual offence. It is probable that the bombs will be few in number and large in size, and the first point of immediate interest in this connection is to know what effect the sudden release of several hundred pounds weight of bombs will have on the airship. Fortunately we have reliable data at hand. It was calculated by the constructor of "La Patrie" that when she suddenly escaped from her moorings she was at once relieved of a weight of 1,653 lbs.; she shot up to a height of 6,562 ft. without any injury and without the valve being touched. An airship designed for this service would be constructed with a ballonette and valve, so that gas could rapidly be let out without affecting the extended form of the aerostat. Captain Neumann estimates roughly that the unloading of 1 per cent. of its own weight will cause an airship to rise 262 ft.

It was stated just now that the bombs used would probably be heavy and few in number; this necessitates careful choice of target and greater accuracy in discharge. We know how intensely local the effect of high explosives is, and *place no reliance on any form of bomb attack by airship which is not based on striking at a vital part, and taking care that the stroke is delivered with the same minute attention to accurate hitting as in the case of gun-fire.*

We do not know what effect the dropping of a heavy bomb of, say, 400 lbs. would have on a battleship; but we do know that the uncapped cast-iron shell of 448 lbs., containing 28 lbs. of powder, which the Japanese fired from their 11-in. howitzers on 203 Metre Hill against the Russian ships at Port Arthur, were disappointing in their results; they struck the decks at an angle of about 30° with the vertical; 4 out of 12 hits penetrated the 2-in. armoured deck of the "Peresviét," but did no great damage after penetration, and, indeed, generally speaking, none of the shells which penetrated the decks of the other ships seem to have played any great part in sinking them. As *Engineering* says, "the effect was less noticeable than might have been expected." A bomb dropped from an airship can, weight for weight, contain far more explosive material than a shell fired from a gun; the former only requires a casing sufficiently strong to hold the contents, and relies for its effect entirely on the violence of the explosion; the latter requires a case strong enough to resist the shock of discharge and the high gas pressure in the gun, and depends greatly on its penetrating power and the violent disruption of its case in the form of splinters. The weight of explosive bears a very small proportion to the weight of the case.

I am not aware of any experiments which would give us reliable data on this subject, but it appears to me that the time has arrived for carrying out such experiments, so that we may know for certain:—

a. What is the best explosive to use for aerial bombs;

b. What weight is required to render a battleship unseaworthy, to destroy a dry dock, or to wreck a battery;

c. From what height such bombs can be dropped with accuracy on their target;

d. Whether the height from which they are dropped appreciably affects the violence of the explosion;

e. What effect a burst under water would have on torpedo craft and submarines and at what distance.

Let us now consider what is the probable procedure of an airship under the three headings mentioned. The average height of clouds in most parts of Europe is from 3,900 ft. to 4,500 ft. in winter, and from 9,900 ft. to 13,200 ft. in summer. In cloudy or misty weather airships can keep very low without much danger of being seen from the ground, even when they can see sufficiently well to locate themselves. It is exceedingly difficult for an observer on the ground to locate an airship in the dark, even with the aid of searchlights; the lower they travel the less easily will they be spotted, and on a clear night they can find their way easily over land.

It may therefore be deduced that:—

1. An airship will usually carry out reconnoissances by day, and rely for safety in taking advantage of atmospheric conditions of vapour or cloud, or in her inherent power of rapidly altering her altitude.

2. But for discharging bombs the night will be preferred, as she can then approach within close range of her target, thus ensuring accuracy; the proximity of the target will be limited by the effective radius of the explosion in respect of the fragile structure of the airship—this radius should be determined by experiment.

We now come to the question of defence and counter-attack against airships.

At present the only means at our immediate disposal are the high-angle batteries which exist in many of our coast fortresses, and these could readily be assisted by a suitable adaptation of the existing system of electric lights. The following table shows the capabilities of the 19-in. R.M.L. gun, on a H.A. mounting, as regards the highest altitude reached by the trajectory at 45° and 70° elevation respectively, and the horizontal distance measured to a point vertically below the highest altitude:—

10-inch R.M.L. Gun on H.A. Mounting.

Elevation.	Height of Maximum Ordinate.	Range to Maximum Ordinate.
45° ...	7,300 feet	... 4,600 yards
70° ...	12,600 ,,	... 2,870 ,,

From this table it is clear that existing H.A. batteries would be unable to interfere with the airships engaged by day in reconnaissance or observation to any appreciable extent, since, in order to attain a height of only 7,300 ft., it is necessary that the battery should not be more than 4,600 yds. from a point vertically below the target. This obviously limits the sphere of action of H.A. batteries to such an extent that airships can defy them with impunity, and this, apart from the fact that their rate of fire and the excessively long time of flight, renders it hopeless to attack an airship on the move. But the case of an airship dropping bombs is on a different footing. Here it is essential that the airship should take up a position vertically above the target, and remain there sufficiently long to discharge her bomb with accuracy. Once she is over the target, there may be little delay in releasing the bomb; but it will undoubtedly take an appreciable time to manœuvre into position, and while she is hovering, so to speak, she will offer a target to a H.A. battery. It seems unlikely that an airship could discharge bombs from a greater height than 5,000 ft., owing, not merely to the difficulty of ensuring a hit, but also to the fact that the attainment of a high altitude cannot be achieved without the sacrifice of ballast, which in this case means bombs. At a rough approximation, in such a case as we are considering, 250 lbs. weight would have to be sacrificed for every 1,000 ft. of altitude. We shall be quite justified, therefore, in considering that any area within 5,400 yards of a H.A. battery is protected by it, in respect to the attack of a bomb airship, since at this distance the vertical field of fire attains a height of 5,000 ft.

The difficulty of spotting the airship at night will be very great; she has everything to gain by a night attack, inasmuch as she is not only more difficult to see, but she is more difficult to spot at a low altitude than at a high altitude. The lower the altitude, the greater weight or bombs she can carry, and the greater the accuracy with which she can discharge them. Everything, therefore, points to night attack. It is clear that the field of operations of the airship must be illuminated, otherwise she would have nothing to fear in the way of attack. The idea of trying to pick up an airship with searchlights may be dismissed at once; the only practical plan seems to be to illuminate all fields of operation which may be used for the attack of vital areas by means of suitably arranged dispersed beams pointing skywards.

It is most unlikely that any of our coast-defence guns would be able to attack a reconnoitring airship, as she would naturally run inland out of range, and then turn and approach the harbour from the land side. It is possible that some of the movable armament might keep her on the move, but it can scarcely be expected that anything more than this could be effected, and there would obviously be limitations to the employment of the movable armament for such a purpose, inasmuch as although their fire is unlikely to cause much uneasiness to the airship, it is certain to cause a considerable amount of bodily discomfort to persons on *terra firma* who may be hit by splinters and bullets.

Thus far we have dealt only with existing means of defence, and it appears that though they are obviously inadequate, yet they are not without value. The introduction of armament for special employment against airships seems to be an immediate want. The Germans have tackled the question for land operations, and it is time that we did the same for harbour defence. The most suitable gun would appear to be a light Q.F. gun on a special mounting with an all-round traverse and a possible elevation of 70°, a shell weighing 3 lbs., containing an easily detonated explosive, and having a high muzzle velocity; the fuze must be a specially sensitive one in order to cause explosion on penetration of the gas envelope. The effect aimed at would be the explosion of the gas in the envelope, thus ensuring the complete destruction of the airship. This will be a far more effective method of attack than that suggested for H.A. batteries, inasmuch as the latter would be dependent on damage done by shrapnel bullets to the *personnel* or to the motor, the penetration of the envelope by bullets being incapable of producing a sufficiently appreciable effect on the buoyancy to render the airship unserviceable as an aerostat.

Counter-Attack.

But artillery alone will scarcely be able to deny to an enemy's airships such access to the upper air of our harbours and dockyards as may be necessary for reconnoitring and observation; this *rôle* can only be satisfactorily fulfilled by harbour airships, or, perhaps better still, by aeroplanes, and the artillery defence must in this respect be regarded as auxiliary only.

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